

LOUISIANA DEPARTMENT OF WILDLIFE & FISHERIES



**OFFICE OF FISHERIES
INLAND FISHERIES SECTION**

PART VI -B

WATERBODY MANAGEMENT PLAN SERIES

LAKE BRUIN

**WATERBODY EVALUATION &
RECOMMENDATIONS**

CHRONOLOGY

DOCUMENT SCHEDULED TO BE UPDATED ANNUALLY

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WATERBODY EVALUATION

STRATEGY STATEMENT

Recreational

Bass anglers are afforded the opportunity to catch quality sized largemouth bass *Micropterus salmoides* through the introduction of Florida largemouth bass *M. floridanus*. Other sportfish species are managed to provide sustainable populations while providing anglers the opportunity to catch or harvest numbers of fish adequate to maintain angler interest and efforts. Lake Bruin also supports a population of spotted bass *M. punctatus*. Hybrid striped bass *Morone chrysops* x *M. saxatilis* are stocked to provide an open water predatory species to utilize excess shad *Dorosoma spp.* and provide additional recreational fishing opportunities.

Commercial

Lake Bruin supports an abundant commercial fishery. Commercial species are managed with an abbreviated season to reduce user group conflict.

Species of Special Concern

No threatened or endangered fish species are found in this lake. However, Lake Bruin is one of a few landlocked Mississippi oxbow lakes with a population of gulf pipefish.

EXISTING HARVEST REGULATIONS

Recreational

Statewide regulations for all fish species, the 2013 recreational fishing regulations may be viewed at the link below:

<http://www.wlf.louisiana.gov/fishing/regulations>

Commercial

To minimize conflicts between recreational and commercial user groups, commercial fishing in Lake Bruin is restricted to a season from November 1 through the end of February. Restricting netting to this time of year when recreational fishing, boating and water skiing are minimal has reduced user group conflicts and allowed the commercial harvest of buffalo, common carp, and other fish species that compete with game fish for habitat. Commercial fishermen are required to obtain special permits and file catch reports each year to use webbing in Lake Bruin.

The use of fish nets in Lake Bruin is prohibited **EXCEPT** that a special recurring commercial season allowing the use of gill and trammel nets having a minimum mesh size of 3 ½ inches bar and 7 inches stretched and allowing the use of slat traps is permitted. The season commences each year at sunrise on Nov. 1 and closes at sunset on the last day of February the following year. Commercial fishermen must obtain a Lake Bruin Commercial Fishing Permit in order to participate in this special season and must file a catch report at the end of the season. The permit is issued at no cost on a seasonal basis.

The 2013 commercial fishing regulations may be viewed at the link below:

<http://www.wlf.louisiana.gov/fishing/regulations>

Species of Special Concern

No threatened or endangered fish species are found in this waterbody.

SPECIES EVALUATION

Recreational

Largemouth bass, spotted bass and crappie are targeted in standardized sampling in Lake Bruin as species of special interest due to their popularity with recreational anglers and as an indicator of overall fish population health due to their high positions in the food chain. In years past, bass and other fish species were sampled using biomass surveys (rotenone). Rotenone sampling was used extensively in Lake Bruin from 1954 until 1998. Biomass sampling is an excellent method for determining total fish population characteristics. However, recent increases in lakeshore residents and changes in public attitudes have made this method of sampling controversial. As a result, other sampling methods are used instead. Electrofishing is the best indicator of black bass abundance and size distribution, with the exception of larger sized bass. Gill net sampling is used to determine the status of large bass, hybrid stripers, buffalo, carp and other large bodied species. Shoreline seining is used to collect information related to bass reproduction by assessing the abundance of young-of-the-year (YOY) recruits.

Black Bass

Lake Bruin supports both largemouth bass and spotted bass. Largemouth bass are the more abundant species. Figure 1 indicates standing crops of black bass (largemouth and spotted bass combined) from biomass sampling for the years 1981 to 1998. Fall drawdowns were conducted on Lake Bruin for three consecutive years in 1988, 1989 and 1990. The black bass standing crop for 1990 of 65.8 pounds per acre was the highest ever recorded in 30 years of sampling going back to 1954.

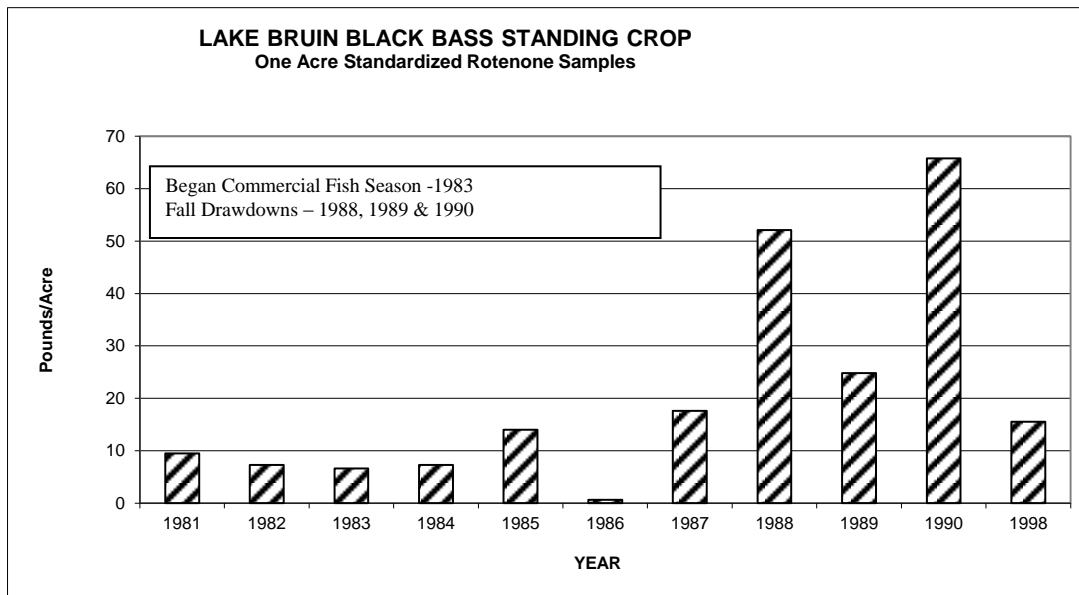


Figure 1. Black bass standing crop estimates from biomass (rotenone) samples on Lake Bruin, 1981 – 1998.

Electro-fishing data is also used as an indicator of bass relative abundance and size distribution in Lake Bruin. Figure 2 indicates largemouth bass electrofishing catch per unit of effort (CPUE) for different size groups from 1996 to 2006. CPUE fluctuated considerably during this sampling period with the lowest values recorded during the years of 2001 and 2006.

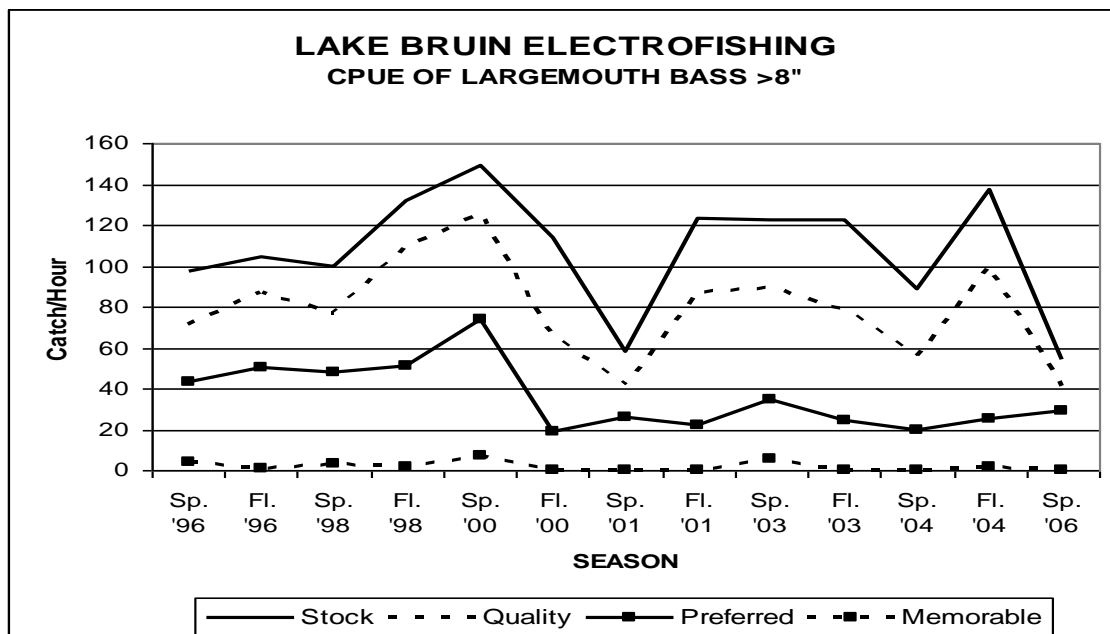


Figure 2. The Catch per unit effort of three size classes of largemouth bass from spring and fall electrofishing on Lake Bruin, 1996 – 2006.

Catch per unit effort from recent electrofishing samples is shown below for spring and fall samples (Figures 3, 4). The size distribution in inch groups of the most recent electrofishing sample results conducted in 2011 is shown in Figure 5. The population appears to be in balance, with size classes normally distributed. The proportional stock density (PSD) values from 2011 spring and fall electrofishing samples were 63 and 74, respectively (Table 1). PSD for largemouth bass is defined as the proportion of quality-size bass (>12 inches) to bass in the sample population greater than stock-size (>8 inches). The 2011 values are both near the upper end of the desirable range, indicating either an overabundance of larger size fish or reduced number of stock-size fish. Relative stock density (RSD) is a similar statistic index used to determine the proportion of various size classes of fish in the population. For example, the RSD_{15} value would indicate the proportion of preferred-size (>15 inches) bass, to bass in the sample population greater than stock-size. The RSD_{15} values for spring and fall were 23 and 24, respectively.

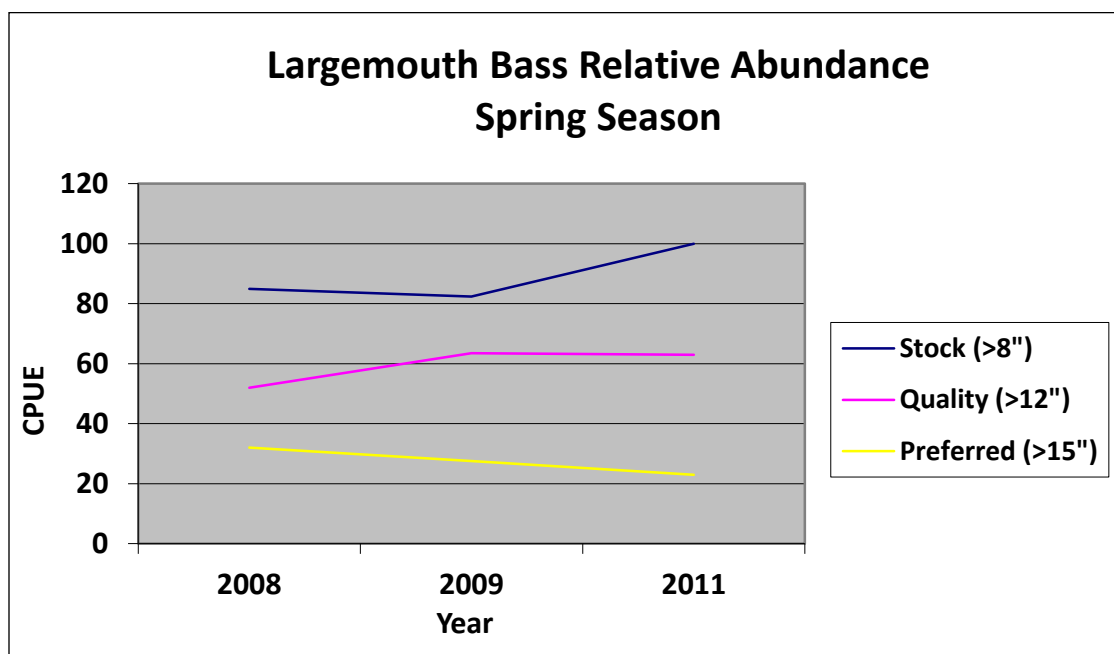


Figure 3. The catch per unit effort (bass per hour) of three size classes of largemouth bass from spring electrofishing results on Lake Bruin, 2008 – 2011.

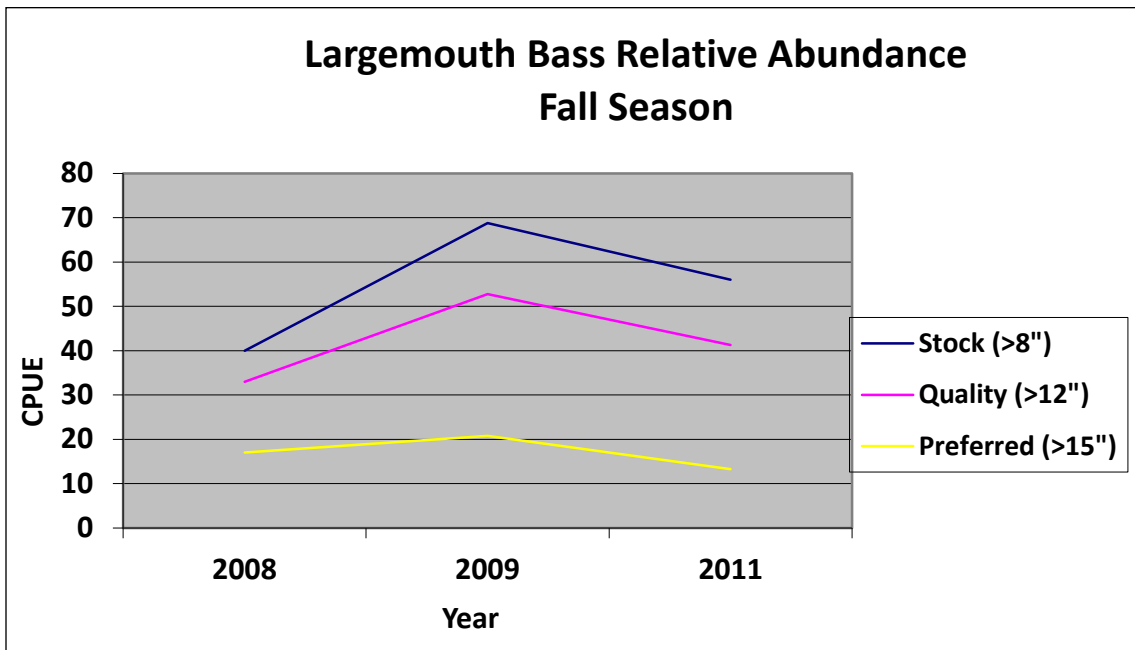


Figure 4. The catch per unit effort (bass per hour) of three size classes of largemouth bass from fall electrofishing results on Lake Bruin, 2008 – 2011.

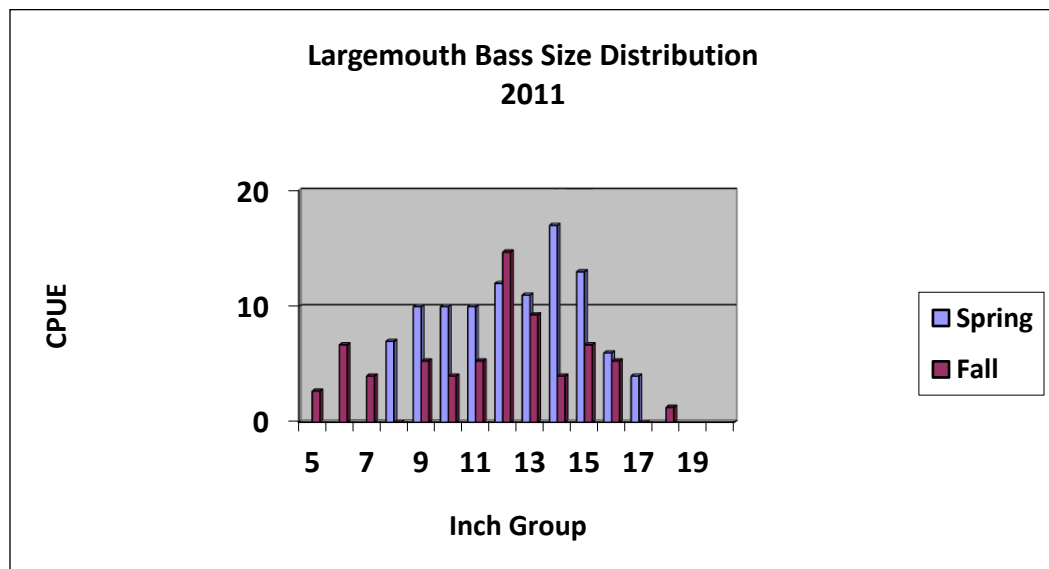


Figure 5. The size distribution (inch groups) of the largemouth bass population estimated from spring and fall electrofishing samples on Lake Bruin, 2011. N (spring) = 98. N (fall) = 68.

Table 1. Proportional stock density (PSD) and relative stock density (RSD) values of preferred-size (>15 inches) largemouth bass from electrofishing results on Lake Bruin in 2008, 2009, and 2011.

INDEX	2008		2009		2011	
	Spring	Fall	Spring	Fall	Spring	Fall
PSD	61	83	77	77	63	74
RSD _{pref.}	38	43	33	30	23	24

Forage

Gizzard shad *D. cepedianum*, threadfin shad *D. petenense*, Mississippi silverside *Labidesthes sicculus*, and various small minnows, shiners, and darters occur in abundance in Lake Bruin. Sunfish *Lepomis spp.* species including bluegill *L. macrochirus* and redear *L. microlophus* are also abundant. Crawfish and grass shrimp provide additional food for predatory fish species. Past biomass sampling showed an excess of shad and other forage species and high numbers of intermediate sized sunfish indicating a stunted bream population. Periodic fall drawdowns in Lake Bruin have been conducted partly to reduce excess forage fish numbers and improve bream sizes by concentrating fish to increase predation. Hybrid striped bass have been stocked to provide an additional open water predator species to control excess shad. The chart below (Figure 6) gives a summary of Lake Bruin biomass sampling from 1981-1998 showing standing crop of forage species (gizzard shad, threadfin shad, shiners and darters) in pounds per acre.

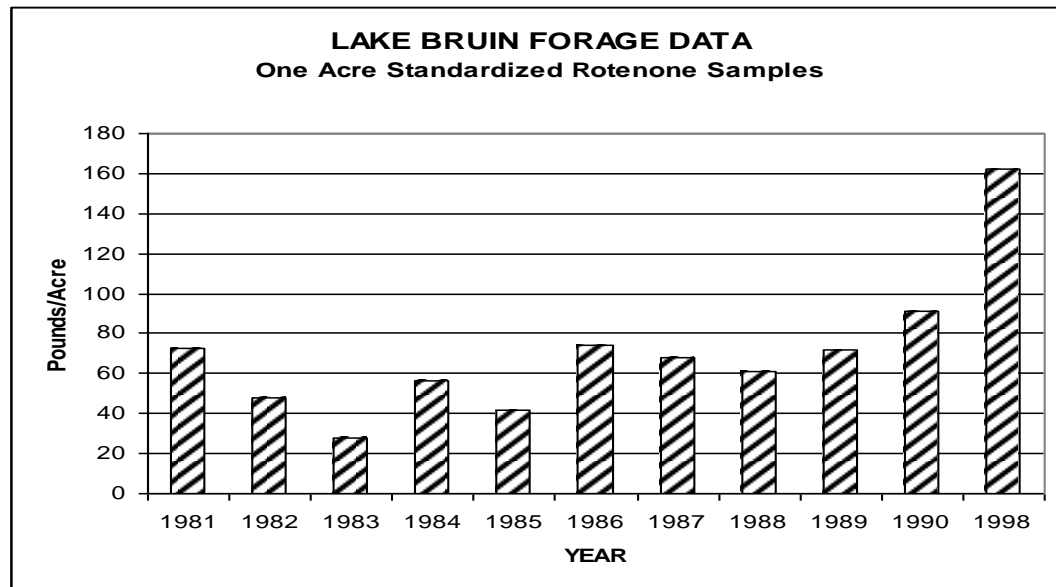


Figure 6. The pounds per acre of forage species estimated from biomass sampling on Lake Bruin, 1981 – 1998.

In recent years, rotenone sampling has been discontinued. Forage is now sampled by shoreline seining, electrofishing and indirectly by the measurement of largemouth bass relative weights (Wr). This measurement is obtained from fall samples only and is defined as

the ratio of a fish's weight to the weight of a "standard" fish of the same length. The Wr index is calculated by dividing the weight of a fish by the standard weight for its length, and multiplying the quotient by 100. Relative weights for largemouth bass in Lake Bruin typically measure near 100 for all size groups, indicating a healthy bass population with an abundance of available forage. Largemouth bass values below 80 indicate a shortage of available forage. Figure 7 gives relative weight values for largemouth bass captured in fall 2008 by electrofishing. Electrofishing samples taken in 2009 and 2011 have shown that relative weights of bass continue to be within the desirable range, with Wr of most size classes exceeding 95.

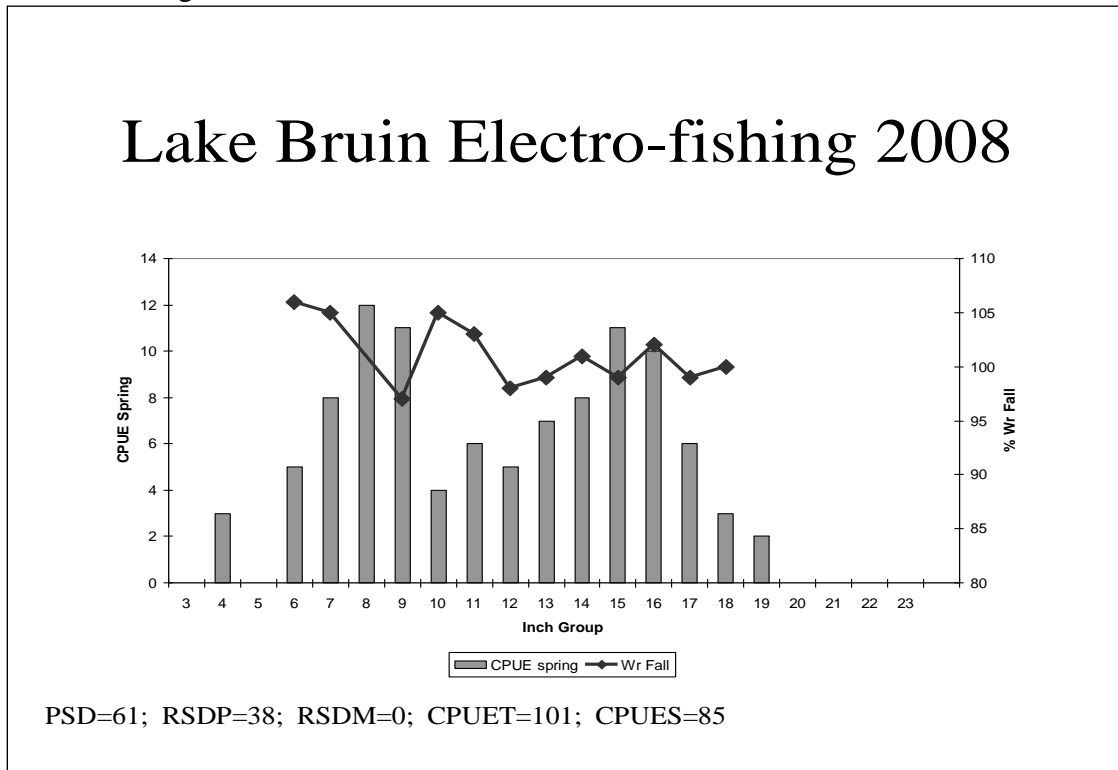


Figure 7. Largemouth bass size distribution (inch groups) and relative weight from fall electrofishing results on Lake Bruin, 2008. N = 101.

Genetics

Florida bass have been stocked into Lake Bruin in an attempt to increase the genetic potential for production of large bass. Florida bass have been stocked in Lake Bruin ten times between 1999 and 2012. Stocking rates have been low (10 per acre) and the size of the fingerlings have been small (< one inch). Genetic analysis in 2003 after only 3 years of Florida bass stocking at 10 per acre, showed 1 % Florida and 4 % hybrid for a total Florida genetics influence of 5%. Greater success has been seen in lakes stocked at higher rates over more consecutive years and with larger "phase 2" fingerlings. Table 2 shows ratios of Florida, native and hybrid largemouth bass from Lake Bruin samples.

Table 2. Percentage of largemouth bass genomes in Lake Bruin largemouth bass

LAKE BRUIN LARGEMOUTH BASS GENETICS SAMPLING					
Year	Number	Northern	Florida	Hybrid	Florida Influence
2003	100	95%	1%	4%	5%
2006	102	90%	3%	7%	10%

Age and Growth

Sagittal otoliths were extracted from largemouth bass collected during 2006 fall electrofishing for age and growth analysis. In comparison with statewide length and age at capture data, growth rates in Bruin are generally above the state average (Figure 8). This growth rate is typical of Mississippi River oxbow lakes that have higher growth rates than less fertile reservoirs.

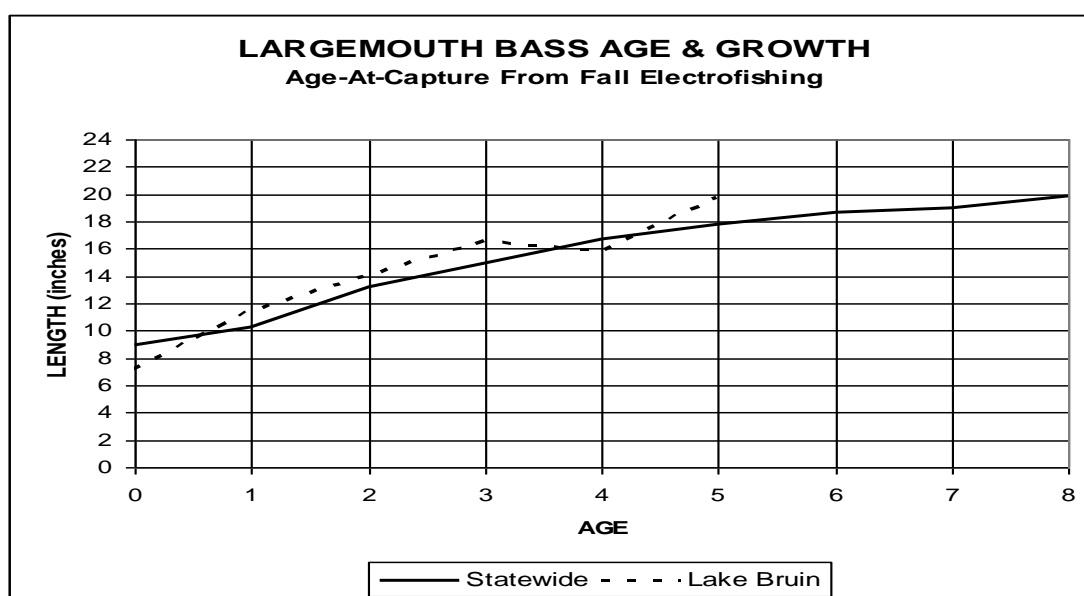


Figure 8. Length-at-age of Lake Bruin largemouth bass collected from fall electrofishing samples in 2006.

Largemouth Bass Mortality Study

A three-year mortality study on largemouth bass will be initiated in 2013. The study will involve intensive sampling in spring and fall, and included genetics and age and growth analyses. A recreational creel survey will be conducted in 2015 to assess angler fishing mortality on the bass population. Information from the growth and mortality results of this project will be used to assist in the management of largemouth bass in Lake Bruin.

Crappie

Both black and white crappies occur in Lake Bruin and are very popular with recreational anglers. Considerable interest has been expressed in improving crappie fishing in the lake. Crappie populations and angler satisfaction have varied considerable over the years indicating both the cyclic nature of the species and the difficulty in obtaining reliable

population data with standard sampling techniques. Crappie populations were sampled in Lake Bruin with biomass (rotenone) surveys from 1954-1998. Figure 9 shows crappie standing crop in pounds per acre from biomass sampling for 1981-1998. Crappie standing crop increased dramatically in 1990 following the drawdowns of 1988 and 1989. The 1990 standing crop of 15.1 pounds of crappie per acre was by far the highest of any year on record.

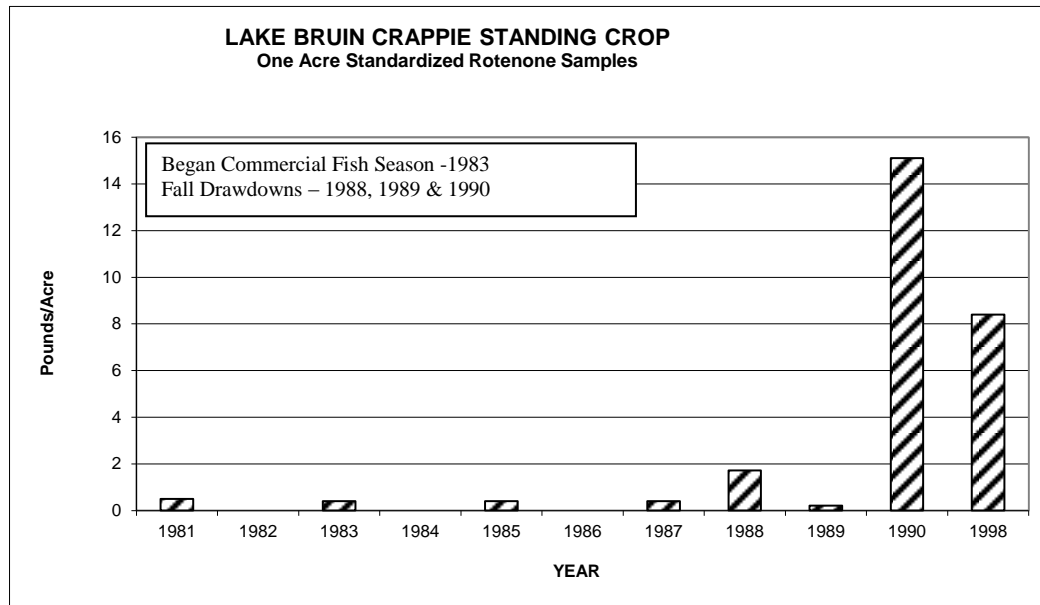


Figure 9. Standing crop of crappie in pounds per acre from biomass (rotenone) sampling conducted on Lake Bruin, 1981 – 1998.

From 1989 to the present, crappie have been targeted (secondary target species with bass as the primary) in spring and fall electrofishing samples. Crappie CPUE in electrofishing sampling has been variable, even between spring and fall sampling of the same year. The variance is attributed to sampling variability more so than actual population changes. In 1993 and 1997 crappie were collected for age and growth analysis with the use of frame nets. Growth rates for crappie in Lake Bruin appeared good. The technique of sampling crappie with lead nets has recently been used with good success in other lakes and this technique will be used to sample Lake Bruin in the future. Figure 10 indicates catch per hour for crappie in spring and fall electrofishing in Lake Bruin from 1996-2000.

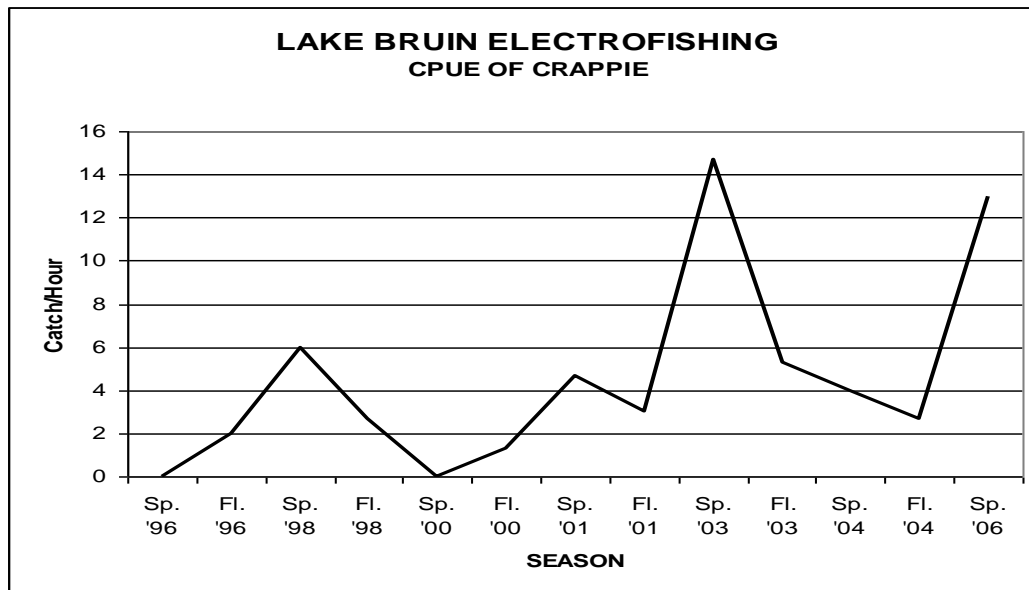


Figure 10. The catch per unit effort for crappie by year from spring and fall electrofishing samples conducted on Lake Bruin, 1996 – 2006.

Crappie Mortality Study

A three year mortality study will be initiated in 2013 and is to coincide with the largemouth bass study. A minimum of 250 crappie per year will be collected with use of lead nets in the fall for length distribution and for age and growth information. A recreational creel survey will estimate angling mortality on crappie.

Commercial

Bigmouth buffalo, smallmouth buffalo, black buffalo, common carp, freshwater drum, spotted gar, shortnose gar, longnose gar, blue catfish, channel catfish and flathead catfish are all found in abundance in Lake Bruin. Past biomass (rotenone) sampling has indicated an overabundant community of commercial species (buffalo, carp, and drum), forage species (threadfin and gizzard shad) and non-predatory game fish species (sunfish). Special commercial fishing regulations were established for Lake Bruin in 1983, including a recurring winter commercial season by permit only and a minimum mesh size of 3 ½” for gill and trammel nets (statewide regulation is 3”). These special regulations have allowed the commercial harvest of these species with minimal impact to sport fish and recreational interests. Figure 11 shows standing crop of commercial fish species in pounds per acre from biomass samples taken from 1981 – 1998.

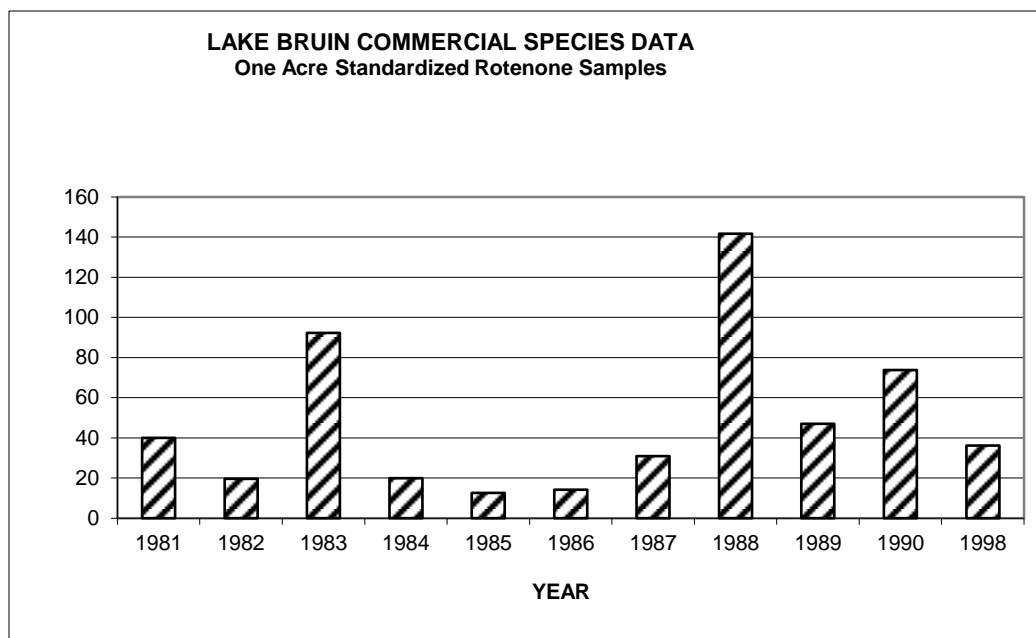


Figure 11. Standing crop in pounds per acre of commercial species estimated from biomass (rotenone) sampling on Lake Bruin, 1981 – 1998.

In addition to biomass sampling, commercial fish species are sampled by winter gill netting (Nov.-Feb.). From 1982-1985 gill nets used were 3", 3 ½" and 4" size mesh. Since 1994, mesh sizes fished were 2 ½", 3", 3 ½" and 4". Table 3 gives the catch per net night (100' of net fished for 1 night) in weight (in pounds) of commercial fish caught in all mesh sizes by season.

Table 3. Gill net CPUE in pounds per net night by year in Lake Bruin, LA 1982 – 2008.

	82-83	83-84	84-85	94-95	95-96	98-99	00-01	02-03	03-04	07-08
Species										
C. Carp	22.18	1.72	2.74	0.00	2.62	7.10	3.04	1.15	0.39	1.64
Drum	0.00	0.00	0.04	0.45	0.25	0.19	0.15	0.20	0.36	0.19
SM Buf	29.84	49.82	8.89	0.00	0.00	6.49	5.55	2.58	0.99	0.63
BMBuf	26.51	22.49	3.12	0.75	1.55	0.99	1.35	0.78	1.26	0.47
Blk Buf	10.05	22.50	0.20	0.00	0.00	0.59	0.00	0.00	0.00	0.16
FH Cat	0.93	0.00	0.00	0.33	0.00	0.00	0.15	0.52	0.00	0.00
C Cat	0.00	0.00	0.06	1.64	0.06	1.11	1.19	0.30	1.16	0.58
Gar	0.12	0.00	0.09	0.00	0.00	0.65	3.05	0.00	0.00	0.00
Bowfin	0.00	0.00	0.00	0.00	0.11	0.00	0.00	0.00	0.00	0.00
G Shad	0.00	0.00	0.00	0.00	0.17	0.00	0.32	0.75	0.00	0.36
G. Carp	0.00	0.00	0.00	0.00	0.00	0.49	0.00	0.00	0.00	0.00
Total	89.63	96.53	15.14	3.17	4.76	17.61	14.80	6.28	4.16	4.03

The most recent gill net sample, conducted in January, 2012, confirmed the presence of several commercial species. The CPUE values for these are given in Table 4. Hybrid striped bass are also commonly captured in gill nets. The most recent sample shows an abundant hybrid striper population. They ranged in length from 16 to 24 inches (Figure 12).

Table 4. Catch per unit effort (total catch in 96 net hours) of commercial species from gill net sampling in Lake Bruin, February, 2012.

Species	CPUE
Buffalo spp.	0.073
Carp (common)	0.052
Channel catfish	0.198
Flathead catfish	0.063
Freshwater drum	0.021
Gar	0.010

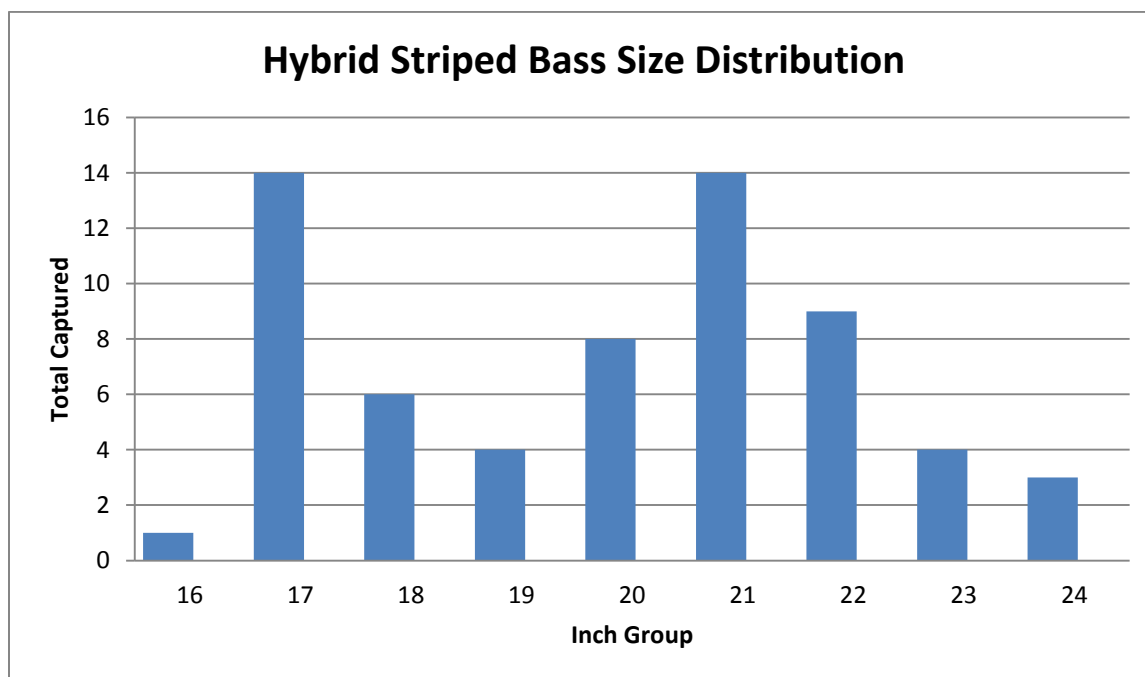


Figure 12. Length frequency distribution of hybrid striped bass from gill net sampling on Lake Bruin in January, 2012. N = 63.

Species of Special Concern

No threatened or endangered species are known to occur in Lake Bruin.

HABITAT EVALUATION

Aquatic Vegetation

The Lake Bruin shoreline is lined with cypress trees that cover about 5% of the lake area. Submerged vegetation includes coontail *Ceratophyllum demersum*, naiad *Najas guadalupensis*, pondweed *Potamogeton spp.*, and filamentous algae. Floating vegetation includes lotus *Nelumbo lutea*, water hyacinth *Eichhornia crassipes*, alligator weed *Alternanthera philoxeroides*, and water primrose *Ludwigia spp.*

Total aquatic vegetation coverage has ranged from 5%-15% (see Part A, **Appendix III**) for vegetation type maps. Occasional complaints related to aquatic vegetation are received from shoreline property owners. Maintenance spraying is periodically conducted to keep public access areas open to boating. Because the Lake Bruin can be lowered only 4 - 5 feet below pool stage, and submersed vegetation occurs at depths up to 6 feet, drawdowns have been only partially successful in temporarily controlling submerged vegetation. In recent years, the main lake area has not had any serious vegetation issues. Vegetation management has been limited to the Brushy Lake area (see below - Condition Imbalance) and Ruth's Ditch, where the drawdown structure is located. Water hyacinth will often form dense mats in this area and requires herbicide treatment.

Substrate

The filling in of oxbow lakes is a natural process that normally occurs over many centuries. This process is accelerated by land use changes that increase erosion and runoff in the watershed of a lake. Conversion of bottomland hardwood forests to row crop cultivation has increased soil erosion and silt laden runoff entering Lake Bruin. In addition, construction of the spillway in the 1950's, raised the summer pool stage of the lake, stabilized water levels and essentially eliminated the natural occurring annual low water season that occurred prior to spillway construction. Consequently, the drying conditions that served to firm and stabilize these sediments no longer occur with regularity. These changes have resulted in the deposition of soft silts over parts of the lake bottom, particularly in the shallow portion known as "Brushy". These soft bottom sediments can reduce spawning success of nesting game fish species. Also, in the past, the Tensas Parish Police Jury regularly opened the spillway gates in the spring to reduce pier flooding. This reduction of spring high water during the spawning season reduces spawning success of game fish, particularly crappie. By the early 1980's anglers complained that fishing in general and especially crappie fishing was not as good as it had been in the past. LDWF was asked to investigate the problem and make recommendations to the Police Jury and Lake Commission. LDWF recommendations included a series of water level fluctuations to emulate the natural flooding and drying cycle that occurred prior to spillway construction.

Artificial Structure

Almost the entire shoreline of Lake Bruin is developed with numerous large piers supplementing the natural shoreline cover provided by cypress trees and aquatic vegetation. Open water cover is scarce, however. In order to provide additional open water cover in Lake Bruin, LDWF in cooperation with the Lake Bruin Recreation and Water Conservation District, built and placed over 200 plastic pallet type artificial reefs in Lake Bruin in 2004. See MP-A for reef locations.

CONDITION IMBALANCE / PROBLEM

Biomass sampling indicated an out of balance fish community with rough commercial species (buffalo, carp, and drum), forage species (threadfin and gizzard shad) and non-predatory game fish species (sunfish) dominating the population. Bluegill and other sunfish species have generally averaged small in size with available sized bluegill (> 5") making up less than 50% of the total bluegill standing crop. Efforts to correct these problems are discussed below.

The shallow Brushy Lake area located on the southwest end of Lake Bruin continues to be infested with excessive aquatic vegetation, which impacts the numerous shoreline property owners in this area. Coontail, American lotus, and alligator weed are the most problematic species in this area. Dense mats of this vegetation prevent navigation from private piers to the main lake. This area also does not de-water during drawdowns due to a submerged earthen dam. During the fall drawdown of 2011, the Lake Bruin Recreation and Water Conservation District received authorization from the USACE to conduct a channel deepening project in Brushy. The District contracted with an owner of a bucket boat to dig the channel. The water level became too shallow for the boat to operate and did not dry sufficiently to allow other types of equipment to be operated.

CORRECTIVE ACTION NEEDED

Brushy Lake will continue to be infested with nuisance vegetation as long as the average depth remains approximately 2 ft. at pool stage. Deepening of this area will be required to permanently resolve the situation. Currently, LDWF plans to maintain a navigation channel through Brushy into the main lake with the use of herbicides. Glyphosate (.75 gal/acre) or 2,4-D (0.5 gal/acre) will be used to treat lotus, while subsurface injection of diquat dibromide (1.0 gal/acre) will be used for coontail to maintain a 30 ft. wide channel. Foliar application of Clearcast (imazamox) herbicide will be used for alligator weed around the private piers at a rate of 1.0 gals/acre.

RECOMMENDATIONS

- 1) It is recommended that Lake Bruin be placed on a 5-year drawdown schedule, with the next to be initiated in 2016. The drawdowns will be multi-purpose: for vegetation control, dock and seawall repair, fisheries enhancement, and a potential habitat enhancement project (coordinated by Parish) in the Brushy Lake area. Agreement with the Lake Bruin Recreation and Water Conservation District (LBRWCD) will be required. The drawdown will be conducted by the LBRWCD under the supervision of LDWF according to the following schedule:
 - a. Fall – Beginning the first Tuesday of September (the day after Labor Day), the two 6' wide metal slide gates in the control structure should be opened to dewater Lake Bruin. The lake should be dewatered at a rate not to exceed 4" per day. The flow shuts off at around 57.5 ft. MSL, determined by the bottom elevation of the Ruth Ditch outflow channel. This usually takes approximately 60 days and results in reducing the water level by 4 ½ feet and exposing approximately 15% of the lake bed. Slightly more dewatering will occur with evaporation.
 - b. Winter – The gates should remain open and the water level should be held at or slightly below the 57.5 drawdown level through the end of December. The gates should be closed to allow for refill no later than January 15th.
 - c. Spring – With normal rainfall, the lake should refill to the 62.0' MSL pool stage by the onset of the spring fish spawning/nursery season (March-May). Water in excess of the 62.0 level will exit the lake by overtopping the structure. Opening the gates to eliminate storm runoff during this time should be avoided since dropping water levels too fast while fish are nesting in shallow areas and can be detrimental to recruitment. The gates should remain closed through this critical fish spawning/nursery season (March-May) if at all possible.
 - d. Summer – Maintain lake levels at or near the 62.0' MSL pool stage throughout the summer.
- 2) Standardized sampling should be continued on Lake Bruin on an every other year basis in order to monitor fish populations. Data from standardized sampling, together with angler satisfaction and public input will be used to determine the need for future lake drawdowns or other corrective measures. See Table 4 of MP-A.
- 3) Commercial fish seasons to allow the harvest of rough fish species should be continued.
- 4) Stocking of hybrid striped bass should be continued to provide additional recreational fishing opportunities and an open water predator.
- 5) Stocking of Florida largemouth bass should be resumed using higher stocking rates or larger phase 2 fish.

- 6) No changes in recreational or commercial fishing regulations for Lake Bruin are recommended at this time.

7) AQUATIC VEGETATION RECOMMENDATIONS

- a. Apply appropriate herbicides (2,4-D or glyphosate, as determined by LDAF restrictions to control American Lotus in Brushy Lake by spraying at first emergence, with follow up spraying throughout the growing season as needed. Maintain a navigation channel approximately 30 ft. wide from the entrance to the main lake to the last private pier location. If coontail becomes dense, periodic sub-surface applications of diquat dibromide should be made in the navigation channel.
- b. An aquatic spray crew should make monthly vegetation assessments on Lake Bruin from March – November to determine the need for control. Water hyacinth should be treated with 2,4-D (0.5 gal./acre) except between March 15 – Sept. 1, which is the 2,4-D waiver period. Glyphosate (0.75 gal/acre) should be used during this period. Glyphosate or Imazapyr should be used on other emergent species.